

MAY 28 1993

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

In the Matter of

Replacement of Part 90 by Part 88 to  
Revise the Private Land Mobile Radio  
Services and Modify the Policies  
Governing Them

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PR Docket No. 92-235

**COMMENTS OF THE TELECOMMUNICATIONS INDUSTRY ASSOCIATION**

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## TABLE OF CONTENTS

	PAGE
SUMMARY _____	i
I. INTRODUCTION _____	1
II. ANY TRANSITION TO MORE SPECTRUM EFFICIENT TECHNOLOGY MUST ACCOMMODATE THE SIGNIFICANT IMBEDDED INVESTMENT IN THE 150-174/450-512 MHz BANDS AS WELL AS USERS' NEED FOR CHOICE _____	3
III. SPECTRUM EFFICIENCY INVOLVES MORE ISSUES THAN CHANNEL WIDTH _____	7
IV. IT IS PREMATURE FOR THE FCC TO MANDATE 5 kHz AND 6.25 kHz CHANNELS _____	10
V. THE FCC's CHANNELING PLAN SHOULD PROMOTE TECHNICAL FLEXIBILITY _____	14
VI. THERE ARE MERITS TO A COMMON CHANNELING PLAN FOR BOTH THE UHF AND VHF BANDS _____	15
VII. ALTERNATIVE TO FCC PROPOSED POWER REDUCTION _____	18
VIII. TIA RECOMMENDATIONS FOR EMISSION MASKS AND FREQUENCY STABILITY _____	21

## **S U M M A R Y**

The Telecommunications Industry Association ("TIA") hereby submits its comments to the FCC's *Notice of Proposed Rule Making* seeking to promote more efficient use of the private land mobile frequency bands located below 512 MHz. TIA believes that this "Refarming" Notice represents a landmark proceeding that promises to dramatically affect the manner in which American businesses and government agencies employ radio communications.

The members of TIA are the very manufacturing companies that are pioneering the design and implementation of the next generation of digital and narrow band radio equipment that will ultimately achieve the Commission's sought-after improvements in spectrum efficiency. While TIA shares the Commission's desire to improve efficiency in the private land mobile radio spectrum, it cautions the FCC to ensure that the diverse needs of the private land mobile continue to be satisfied within these frequency bands.

TIA is concerned that the FCC's proposed transition to new technologies does not provide manufacturers with sufficient time to develop the breadth of products needed to serve this market nor does it provide sufficient time for users to amortize their current equipment. Of prime importance, TIA is concerned that the Commission avoid implementing new technology in such a way that would cause major disruptions to ongoing operations or negatively impact any necessary inter-operability with other users. The users of private land mobile systems below 512 MHz have invested nearly \$25 billion dollars in equipment and deserve to have that investment protected.

As indicated in these comments, TIA believes:

- THE FCC SHOULD PROVIDE EXISTING LICENSEES WITH AT LEAST TEN YEARS BEFORE REQUIRING THAT THEY COMPLY WITH NEW SPECTRUM EFFICIENCY STANDARDS.
- IT IS PREMATURE TO MANDATE THE FUTURE USE OF 5 KHZ AND 6.25 KHZ CHANNELS IN THE VHF AND UHF LAND MOBILE BANDS.
- CONTIGUOUS BLOCKS OF SPECTRUM SHOULD BE ALLOCATED TO SPECIFIC USER GROUPS IN ORDER TO PROMOTE TECHNICAL FLEXIBILITY.
- THE PUBLIC INTEREST IS SERVED BY A COMMON CHANNELING

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**COMMENTS OF THE TELECOMMUNICATIONS INDUSTRY ASSOCIATION**

The Mobile and Personal Communications Private Radio Section of the Telecommunications Industry Association ("TIA") hereby submits its comments<sup>1</sup> to the FCC's *Notice of Proposed Rule Making* ("*Notice*") in the above-captioned proceeding.<sup>2</sup> In this "refarming" proceeding, the Commission is seeking to promote more efficient use of the frequency bands below 512 MHz that are allocated to the private land mobile radio (PLMR) services through a variety of technical, operational and policy rule changes. The Commission's *Notice* represents a landmark proceeding that promises to dramatically affect the manner in which American businesses and government agencies employ radio communications.

**I. INTRODUCTION**

The members of TIA fully understand that private land mobile radio is an essential tool for increasing the productivity of businesses and will undoubtedly play a key role in

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<sup>1</sup> These comments represent the majority view of the Section. Individual member companies may file their own comments offering additional and/or alternative recommendations.

<sup>2</sup> *Notice of Proposed Rule Making*, PR Docket No. 92-235, 7 FCC Rcd 8105 (1992).

improving this nation's ability to compete in the global economy. Therefore, it is vital that usable spectrum be available for all that seek to derive the benefits from improved communications capabilities. Indeed, TIA represents the very manufacturing companies that are pioneering the design and implementation of the next generation of digital and narrow band radio equipment that will ultimately achieve the Commission's sought-after

user community, the factors involved which currently allow manufacturers to meet those needs, and recommended alternatives to the existing proposal.

**II. ANY TRANSITION TO MORE SPECTRUM EFFICIENT TECHNOLOGY MUST ACCOMMODATE THE SIGNIFICANT IMBEDDED INVESTMENT IN THE 150-174/450-512 MHZ BAND AS WELL AS USERS' NEED FOR CHOICE.**

In this proceeding, the Commission is proposing to mandate a transition to more spectrum efficient technology for what is probably its most successful radio service -- VHF and UHF private land mobile radio. With more than twelve million active private land mobile transmitters operating in the frequency bands below 512 MHz, it can hardly be argued that the service is now an inefficient user of spectrum. Nor can it be characterized as service whose time is past; more than six million transmitters have been licensed in these frequency bands in just the past ten years!

Even though the 150-174 MHz and 450-470 MHz frequency bands constitute only about 25 percent (24.5 MHz) of the total private land mobile spectrum, they support more than 70 percent of the total number of authorized private land mobile transmitters. A review of FCC licensing data shows that channel loading is high, typically in excess of 500 mobile units per channel within a 70 mile radius of major urban centers. These figures do not even include the six to seven million utility load management receivers, as well as a significant number of pagers operating on mobile system channels.

Perhaps most significant, however, is the fact that equipment now in these bands represents *a total equipment investment by users of approximately \$25 billion dollars.* Clearly, the FCC must ensure that major regulatory changes to a hugely successful service

built with a major investment by American industry must be well founded, offer significant benefits, and avoid placing this major investment at risk.

Notably, the risks go far beyond the financial capabilities of the mobile radio industry to fund a transition to more efficient equipment. The primary risk, and challenge, for the Commission is to ensure that the wide range of communications options needed by the user community continue to be offered in these "workhorse" frequency bands. Over the past 40 years, users have articulated and developed a diverse range of mobile radio needs spanning from simple local area base and mobile systems to wide area simulcast transmission and total-area portable coverage. Competitive manufacturers have developed extensive product portfolios to support both market specific and application specific requirements such as radios used on motorcycles and aircraft as well as radios approved for hazardous or harsh environments. When viewed individually, such specific applications comprise a small minority of the total number of transmitters in service. When viewed together, however, they display the reality that users require significant flexibility to address a whole host of "safety and special" communications services. The Commission's action in this proceeding must not reduce the communications options of end-users or the ability of manufacturers to meet users' diverse needs.

For manufacturers, adequately satisfying all users' communications needs could prove most difficult during the transition phase to new spectrum efficient technology -- the design of which is still on many blackboards. Manufacturers still need to design the very narrow band equipment that the Commission seeks to encourage having the full range of features and options that users now enjoy. Also, much of the equipment sold during the transitional



period will need to be backward compatible with current radio designs. Therefore, a phased approach considering users' requirements is necessary.

The Commission's *Notice* would require existing licensees to reduce their occupied bandwidth by as early as 1996.<sup>3</sup> Further, according to the rules proposed, new users would need to conform to the ultimate spectrum efficiency standards immediately upon the effective date of the future Report and Order.<sup>4</sup> This transition plan is inadequate for both users and manufacturers. Time is needed for manufacturers to design and produce a complete line of equipment necessary to support these new systems including test equipment and monitors. Time is needed for training both self-maintained users and dealer technicians. The parts support mechanism for the installation and maintenance of any new technology needs to be in place. Time is needed to develop budgets to fund new equipment purchases, particularly for larger systems.<sup>5</sup> Of fundamental importance, however, the planning for the transition to new technology must occur without any disruption to critical ongoing operations and must not impact any necessary inter-operability with other users.

In developing a proper transition, the Commission must ensure that it does not confuse the implementation cycles of users with the product development cycles of manufacturers. While technology may be changing to the extent that manufacturing cycles for equipment may be between two and seven years, users clearly have not updated and replaced their systems nearly as frequently. Users such as public safety and public service

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<sup>3</sup> See *Notice* at 7 FCC Rcd 8118.

<sup>4</sup> *Id* at 7 FCC Rcd 8206.

<sup>5</sup> Although particularly true for taxpayer supported agencies such as public safety entities, successful large industrial and commercial users must also plan major capital investments.

most often amortize their investment over at least a period of ten years, with most expecting their systems to have a twenty year life cycle. This is particularly true for change-out of infrastructure that could be required in moving to new technology. The TIA believes that it would be unreasonable for the Commission to require users to replace their system before the useful life of the equipment has expired.

TIA suggests that the FCC adopt at least a 10 year transition plan beginning with the effective date of a Report and Order in this proceeding before requiring existing licensees to comply with the new spectrum efficiency standards and before mandating the use of the new 12.5 kHz or equivalent narrow band equipment by new licensees/operators. During this transition period, the use of equipment that is in conformance with the new standards by both new licensees and existing licensees would be on a voluntary or optional basis.<sup>6</sup> A ten year transition period will allow existing licensees to amortize the value of their mobile and portable radios and maximize the useful life of their equipment. It will also minimize any

### **III. SPECTRUM EFFICIENCY INVOLVES MORE ISSUES THAN CHANNEL WIDTH**

Reducing the width of channels in the private land mobile bands will temporarily decrease the average number of licensees per channel. This will not, however, necessarily result in more efficient use of this spectrum or in a higher grade of service for existing licensees. In particular, the FCC's proposal to reduce operating bandwidth by simply decreasing the deviation of existing 25 kHz equipment without comparable changes to the receiver will not be effective for the following reasons:

- The reduced deviation from the transmitter requires additional audio gain in the receiver particularly for noisy operating environments often encountered in land mobile radio communications.
- The sideband(s) of new transmitters operating at half-channel (or closer) in the spectrum will lie within the receiver passband and will further degrade the receiver performance.
- System range will be reduced because reduced transmitter deviation (*e.g.* 2.0

this regard, TIA believes that it is important for the Commission to keep in mind the unique perspective that users have in judging whether their communications systems are "efficient."

For users, the key criteria are:

- What is the channel access time?
- What is the time required to place a call?
- Is the service quality and reliability acceptable?
- What does it cost to communicate over the required service area?
- What are the incremental costs for expanding one's service area and for adding advanced features?
- Will the new equipment purchases offer backward compatibility for those users requiring it?
- Can interoperability with other systems be maintained during and after the transition to new technology for those users requiring it?

Manufacturers also have a unique perspective when faced with the prospects of designing equipment to comport with new regulations to reduce the amount of spectrum available for transmissions. Undoubtedly, manufacturers view such regulatory changes as an opportunity to sell new equipment. Nonetheless, they are also faced with the following considerations:

- Can the new technology achieve the same level of product and system reliability as existing technology and, if not, do sufficient countervailing benefits for the user exist?
- Will the new technology support all existing product and system features and functionalities and, if not, do sufficient countervailing benefits for the user exist?

- Can overall customer satisfaction be improved or at least be maintained?
- Can the manufacturer help customers meet their needs during the transition to the new technology?
- Is the market for the new technology sufficient to amortize the research and development costs?
- What is the effect on the installed customer base?
- Is it possible to simply modify existing product to satisfy the new requirements and/or bandwidths? Are field modification kits practical?

To the user and the manufacturer, the concept of spectrum efficiency involves much more than channel width. Indeed, from both perspectives, the success of this refarming proceeding does not necessarily hinge upon the number of theoretical channels that can be created and added into the new Part 88 Rule Section. Rather, users will demand that any additional costs incurred because of this proceeding will result in real improvements in the efficiency of their systems -- as viewed from their perspective. While manufacturers generally support regulations that create more opportunities to sell equipment, they remain concerned about the practical limitations of splitting channels and the creation of new

provide input to the Commission later this year, well in time to be considered as decisions in this matter are developed.

**IV. IT IS PREMATURE FOR THE FCC TO MANDATE 5 kHz AND 6.25 kHz CHANNELS**

In its Notice, the Commission proposes to mandate the use of 5 kHz channels in the 150 MHz frequency band and 6.25 kHz channels in the bands between 421 MHz and 512

Commission keeps this proceeding on its present pace, these very narrow band channels could become a regulatory mandate as early as the springtime of 1994.

Incorporating very narrow band technology into the congested spectrum environments that currently exist in these frequency bands presents a spectrum management problem that needs careful study. TIA has serious concerns regarding the feasibility of such an approach as proposed in the NPRM. As the Commission is well aware, the implementation of very narrow band equipment (*i.e.*, 5 kHz) into the 150 MHz band has not been particularly successful.<sup>9</sup> It has now been eight years since 5 kHz technology has been authorized in the 150 MHz band and, frankly, the plan should be viewed as a failure. The Commission has itself recognized this fact by stating:<sup>10</sup>

the current use and channeling plans of other land mobile bands, particularly in the 150 MHz band, provide little opportunity for narrowband technologies to fully develop. Further, we do not believe a reallocation of channels from within the existing land mobile bands for narrowband operation is in the public interest, reallocation would require thousands of existing licensees to be displaced. Further, a reallocation would entail severe costs to a large number of users, many of which are small businesses. It could also have a negative impact on safety services, such as the police and fire services.

The TIA supports this cautious but rational analysis on the problems associated with the introduction of new technologies into the private land mobile spectrum. This should not imply that TIA does not endorse the idea of refarming as a necessary task that should be addressed at the earliest date possible. TIA strongly supports the Commission's intent to

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<sup>9</sup> See 47 C.F.R. § 90.271 of the Commission's Rules. See also *Amendment of Part 90 of the Commission's Rules to Provide for the Use of the 220-222 MHz Band by the Private Land Mobile Radio Services*, 6 FCC Rcd 2356 (1991).

<sup>10</sup> *Report and Order, In the Matter of Amendment of Part 2 of the Commission's Rules Regarding the Allocation of the 216-225 MHz Band*, Gen Docket No. 87-14, 3 FCC Rcd 5290 (1988).

improve spectrum efficiency but urges the FCC to rigorously validate that the introduction of new technologies provide real gain when applied to the existing, congested land mobile environment.

TIA is well aware that the FCC has allocated 5 kHz channels in the 220-222 MHz



within a particular frequency band. It follows then that splitting the channels generates a significantly larger number of potential intermodulation sources. Specifically, by changing the channelization from 25 kHz to 5 kHz increments, the number of channels increase by a factor of 5. But, the number of potential intermodulation interferences per megahertz is increased by a factor of 23.4 for two signal, third order intermodulation, and by a factor of 133 for 3 signal, third order intermodulation interference signals. Finding the one combination of intermodulation interference generating signals at 25 kHz spaced channels is already marginally overwhelming. Considering the above, the number of potential combinations becomes so large that the task is impossible using today's tools. Coordinators, systems engineers and software designers would need to develop new and more powerful tools to evaluate site interference problems. Even with new analytical tools, potential site engineering solutions could very well be impractical due to cost, space limitations, etc.

With these interference potentials in mind, TIA believes that a more prudent approach for the FCC is to mandate a transition to "true" 12.5 kHz or equivalent efficiency equipment, in both the VHF and UHF land mobile bands.<sup>11</sup> Mandating the use of very narrow band equipment in these congested frequency bands at this time is not in the public interest. Real world operational experience with very narrowband equipment is yet to be gained in the 220 MHz band. On the other hand, true 12.5 kHz systems will provide a more graceful

effective when compared to 25 kHz equipment. Properly implemented true 12.5 kHz systems can improve spectrum efficiency and quality of service for all users. TIA, therefore believes that the FCC should forego its proposed transition and instead require users to transition to true 12.5 kHz or equivalent efficiency systems with use of 6.25 kHz or equivalent efficiency as an option. Any further step to mandated very narrow band systems should be revisited only after further development and experience is achieved, for example at 220 MHz.

**V. THE FCC's CHANNELING PLAN SHOULD PROMOTE TECHNICAL FLEXIBILITY**

TIA objects to the Commission's proposal to divert one-third of the VHF band to carrier operations. The basis upon which the Commission initiated this proceeding is the congestion private users currently face. However, this aspect of the proposal would reduce the ability of private entities to secure communications capabilities for internal operations. TIA believes that sufficient opportunities already exist for private carriers in the 800 MHz, 900 MHz and 220 MHz bands. The Commission should carefully weigh the needs of private carriers and the additional efficiencies that they offer with the need for preserving sufficient spectrum to accommodate private internal communications networks.

Further, interspersing different categories of users can thwart the development of new technologies. As the Commission is aware, time division multiple access ("TDMA") and other technologies require contiguous blocks of spectrum greater than 5 kHz each. While the provisions of proposed Sections §§ 88.413 and 88.433 permit channel "stacking," it will be difficult to aggregate sufficient numbers of channels, particularly if the adjacent frequencies

are allocated to different services. Accordingly, the Commission's channel allocation scheme effectively blocks any new technologies that rely upon aggregating multiple channels. TIA takes no position on the continuation of 19 user groups, however, users with similar operational characteristics should be grouped together on contiguous channels. The interspersing of public safety, private carrier, and private industrial/business operations will complicate spectrum management.

In conclusion, TIA vigorously supports the Commission's proposal to permit technical flexibility in the proposed regulations. The rules should be sufficiently flexible to permit all existing and potential technologies. The only standards necessary are those that prevent the transmission of RF energy outside of a user's authorized bandwidth at levels that would cause interference to other licensees.<sup>12</sup> Apart from these emission limitations, there should be no limit on the type of technology envisioned by the regulations.<sup>13</sup>

## **VI. THERE ARE MERITS TO A COMMON CHANNELING PLAN FOR BOTH THE UHF AND VHF BANDS**

In its *Notice*, the FCC has set ultimate channel goals of 5 kHz for the VHF band and 6.25 kHz for the UHF band. In the opinion of the TIA, different target bandwidths for these two bands is not a wise policy and the FCC should choose a single channel bandwidth for these two bands as a long term target.

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<sup>12</sup> See Appendix C for TIA's recommendations for narrow band and very narrow band emissions masks.

<sup>13</sup> In contrast, the Commission's actions in the 220-222 MHz band prevent channel stacking in an effort to provide a proving ground for 5 kHz equipment.

Designing and producing reliable cost-effective land mobile equipment is a complex task requiring significant investment and time. Employing different bandwidths in the 150 and 450 MHz bands would require even more resources.

For example, in tailoring the emissions of a digital transmitter to fit into a lesser bandwidth, either the channel rate can be lowered or a more complex modulation method must be used. Reducing spectrum occupancy by lowering the channel rate results in fewer bits for the vocoder thus reducing audio quality unless a new vocoder algorithm can be developed and applied. Of course, the newly designed vocoder must be field tested to ensure that it performs with adequate robustness compared to vocoders operating at higher sampling rates. Also, reducing the channel rate of properly designed equipment can negatively affect data communications because the time to transmit the same number of bits is lengthened, thus reducing total message throughput. Manufacturers will likely address these problems through the development and use of more complex modulation methods. Unfortunately, the more complex modulation schemes often display lower sensitivity and higher susceptibility to interference which can reduce system coverage area and frequency reuse. In addition, these engineering compromises will add considerable cost to system infrastructure. Substantial field evaluation of these factors must occur before mandating the use of either 5 kHz or 6.25 kHz channels.

Many users require interoperability and all users are impacted by equipment manufacturing costs. Different channel formats (*e.g.*, vocoder or amount of auxiliary control information sent) would make it difficult to translate communications from one band to another. A gateway between bands would have to translate from one rate to another or, even

worse, between different vocoders. Such translations can significantly reduce audio quality. Differing amounts of control information would complicate cross-band communications. Finally, differing methods between bands will complicate the manufacturing process and increase costs. While present equipment uses different RF hardware between bands, the signalling, control, and features are essentially the same. These functions are done in software which represents a significant portion of the development cost and manufacture of radio. Having differences by band will result in different software packages which will increase costs because the economies of scale will be lost.

Both APCO and NTIA have demonstrated flexibility in the acceptance of technologies to accomplish their self determined needs. This sets a valuable precedent for the Commission also to accept accomplishment of its spectrum efficiency objectives by allowing flexibility in application of technologies.

For example, NTIA's Manual of Regulations and Procedures at Section 4.3.7 sets forth the channeling plan for the band 162-174 MHz. Beginning in 1995, all new equipment in this band must be able to operate within a 12.5 kHz channel to accommodate single channel narrow band FM operations. To accommodate systems that offer equal (or better) spectrum efficiencies, the NTIA also allows for other technologies such as TDMA.

Specifically, the NTIA Manual states that "TDMA systems, with at least 1 voice channel per 12.5 kHz. will be allowed and can be accommodated on adjacent 12.5 kHz channels listed in

Similarly, APCO, which has selected a 12.5 kHz bandwidth for the Project 25 standard under development, has demonstrated throughout the standards process its flexibility and openness to a variety of technologies.

## **VII. ALTERNATIVE TO FCC PROPOSED POWER REDUCTION**

The Communications Act specifically requires each licensee to use the minimum necessary power for each communication.<sup>14</sup> TIA agrees with this philosophy. To improve spectrum efficiency through greater channel reuse, the FCC proposes to limit the maximum permitted effective radiated power ("ERP") as a function of antenna height above average terrain ("HAAT"). TIA believes that the Commission's proposal does not adequately address the issues of operational requirements, system costs, or spectrum efficiency.

Licensees have varying coverage area requirements. By imposing rigid ERP/HAAT limitations, licensees with wide area requirements will need to construct additional sites to fully satisfy their needs. This approach was recommended by the Commission in its *Notice*. TIA fails to understand how the construction of additional transmitter sites would result in additional spectrum efficiency. In fact, the Commission's proposal has the capacity to actually reduce spectrum utilization because the additional sites could prove to be more preclusive than the higher powered stations. In addition, the networking of the multiple sites would almost necessarily be performed using microwave spectrum. This would come at a

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<sup>14</sup> Section 324 of the Communications Act states that, "In all circumstances, except in cases of radio communications or signals relaying to vessels in distress, all radio stations, including those owned and operated in the United States, shall use the minimum amount of power necessary to carry out the communication desired." (emphasis added.)

time when the Commission has embarked on a path to transition the current 2 GHz microwave bands to other uses.<sup>15</sup>

Additionally, there are significant real world problems and costs associated with constructing additional transmitter sites. Licensees will incur costs for propagation analysis, new system design, site acquisition or lease, routine maintenance, bringing power to the site and even for building access roads in some cases. Applicants/licensees may need to acquire regulatory approval from the FAA and the Department of Interior. Environmental analyses may need to be prepared and new or modified license applications will need to be processed through coordinators and the FCC. In most cases, local zoning boards will need to be researched and petitioned. All of these factors will increase the financial and operational burdens on the user community to come into conformance with the Commission's refarming proposals.<sup>16</sup> Each of these obstacles has the distinct possibility of ensuring that the mobile communications needs of U.S. businesses will not be completely satisfied. TIA therefore believes that the Commission should abandon its proposed ERP/HAAT limitations.

Rather, TIA believes that the perceived problem of over-powered stations would be better managed by assigning the certified frequency coordinators the responsibility as well as the authority for reviewing the coverage area requirements of applicants during the normal dispatch of their duties. Coordinators should recommend power/height limits in order to

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<sup>15</sup> *In the Matter of Redevelopment of Spectrum To Encourage Innovation in the Use of New Telecommunications Technologies*, ET Docket No. 92-9, 7 FCC Rcd 6100 (1992).

<sup>16</sup> As an example of the potential costs, both financially and in terms of spectrum efficiency, Virginia Power has estimated that it will be required to add 60 percent more base stations if power, height, and transmitter deviations are reduced to levels proposed by the rules.

promote maximum practical spectrum use efficiency while, at the same time, minimizing the radio signal level outside of the defined service area of the applicant/licensee.

To further this objective, TIA proposes the Commission adopt a table of maximum power limits which reflect the variety of coverage required by the land mobile community. Similarly, for situations where users can attain exclusivity, TIA recommends that co-channel mileage separations be tied to required coverage areas.

TIA has attached as Appendix A a series of tables delineating maximum power and co-channel reuse distances as a function of antenna height and the required service radius. These tables are based on R-6602 propagation. Should the Commission ultimately decide that other propagation models are more appropriate, the tables provide a useful format even if the specific values change.

These tables are based on service contours of 37 db $\mu$  for the 150-174 MHz band and 39 db $\mu$  for the 450-512 MHz band. The choice of using 37 db $\mu$  and 39 db $\mu$  as the service area contour signal level in the proposed tables for ERP/HAAT was made for a couple reasons. First of all, the FCC used that signal level in the development of the proposed table in the *Notice*. Second, these are the signal levels which were developed in FCC Report No. R-6406 in 1964, the Carey report. These values have been codified in Part 22 of the FCC Rules as follows:<sup>17</sup>

The limits of reliable service area of a base station engaged in two-way communications service with mobile stations are considered to be described by a field strength contour of . . . 37 decibels above 1 microvolt per meter for stations operating on frequencies in the 152-162 MHz band, and 39 decibels above 1 microvolt per meter for stations operating on frequencies in the 450-460 MHz and

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<sup>17</sup> 47 C.F.R. § 22.504(a) of the Commission's Rules.



470-512 MHz bands. . . . Service within such areas is generally expected to have an average reliability of not less than 90 percent.

TIA worked with the Land Mobile Communications Council (LMCC) to develop these recommendations. The tables attached in Appendix A are the same as those submitted to the FCC April 28, 1993 in LMCC's initial position on refarming. Accordingly, these recommended tables reflect the broad consensus of land mobile users as well as equipment manufacturers.

#### **VIII. TIA RECOMMENDATIONS FOR EMISSION MASKS AND FREQUENCY STABILITY**

The members of TIA have been formulating emissions masks for digital narrowband transmissions in support of APCO Project 25, which is developing standards for public safety land mobile equipment. Notably, the emission mask proposed in the Commission's *Notice* excludes APCO 25 compatible products and every known 12.5 kHz analog product. In effect, the FCC proposed mask forces manufacturers to one limited unproven technology. Attached in Appendix B are TIA recommendations for 12.5 kHz and 6.25 kHz emission masks. Although APCO Project 25 is concerned with only digital modulation, the emission masks described in the attached appendix are intended for both analog and digital modulation. This is part of the migration plan to move to true 12.5 kHz channels in all bands and to provide for possible future migration to 6.25 kHz channels. TIA asks the Commission and other commenters to review these masks and then TIA will offer additional comments in the reply round based on these inputs.